

LAW ENFORCEMENT

Enabling Technologies for Criminal Justice Practitioners 205

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Staff: 3.0 Professionals, 1.0 Technician, 3.0 Support staff

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Objective: To apply science and technology to the needs of the criminal justice community (including law enforcement, corrections, forensic science, and the fire service) by utilizing the resources of EEEL, other NIST laboratories, and external contract support as necessary. While the primary focus is on the development of minimum performance standards, which are promulgated by the sponsoring agency as voluntary national standards, studies leading to technical reports and user guidelines are also undertaken. To accomplish its objective, the Office of Law Enforcement Standards (OLES): (1) develops methods for testing equipment performance and for examining evidentiary materials; (2) develops standards for equipment and operating procedures; (3) develops standard reference materials; and, (4) performs other scientific and engineering research as required.

Background: The Office of Law Enforcement Standards was established in 1971 through a Memorandum of Understanding between the Departments of Commerce and Justice, and was based upon the recommendations of the President's Commission on Crime. The areas of research investigated by this Office include clothing, communication systems, emergency equipment, investigative aids, protective equipment, security systems, vehicles, weapons, and analytical techniques and standard reference materials used by the forensic science community. The composition of OLES projects, which are sponsored by the National Institute of Justice (NIJ) and the National Highway Traffic Safety Administration (NHTSA), and the Office of Management and Budget (OMB), varies depending upon the priorities of the criminal justice community at any given time.

The objectives of NIJ include improving Federal, state and local criminal justice systems and related aspects of the civil justice system; preventing and reducing crimes; and fostering programs that offer a high probability of improving the functioning of the criminal justice systems. Science and technology are among the tools utilized by NIJ to further these objectives and OLES renders support to NIJ in that program area. The projects that comprise OLES's program for NIJ are based upon the recommendations of the Law Enforcement and Corrections Technology Advisory Council and the needs for specific research expressed by the criminal justice community.

The NHTSA program is concerned with three types of speed-measuring devices:

(1) conventional radar units; (2) automated speed enforcement systems, or photoradar; and, (3) laser speed-measuring systems. The projects that comprise NHTSA's program are based

on input from both NHTSA and the International Association of Chiefs of Police. The projects reflect the needs of state and local law enforcement agencies for not only equipment standards, but also for permanent, self-sustaining testing programs to assure the reliability and accuracy of all vehicle speed-measuring systems following the initial approval of a device.

OLES has been funded by OMB to facilitate the development of interoperability standards for ballistic imaging systems, i.e., Drugfire and IBIS. Through the efforts of a team composed of staff members from EEEL and Information Technology Laboratory, the first part of a proposed three-part standard was issued in FY 1996. Support for this program is expected to continue through the laboratory and field evaluations and the development of parts two and three of the standard.

Current Tasks:

1. Develop quality assurance program for soft body armor

FY 1986	Published revision to NIJ Std. 0108.01, Ballistic Resistant Protective Materials and NBSIR 86-34444, Ballistic Tests of Used Soft Body Armor.
FY 1987	Revised body armor standard.
FY 1990	First year of multi-year effort to establish realistic quality control procedures for ballistic fabric used in body armor.
FY 1992	Completed and published the results of a limited experiment to investigate whether the physical size of body armor samples influences ballistic tests; Developed test methods to evaluate the resistance of armor to sharp instrument slashing and thrust attack.
FY 1993	Assisted NIJ in establishing the National Armor Advisory Board (NAAB).
FY 1994	Supported the NIJ Compliance Testing Program.
FY 1995	Discovered a flaw in the proposed aluminum plate test method for defining ammunition as armor-piercing; Assisted DARPA in the development of concealable military body armor.
FY 1996	Assisted DARPA in the development of concealable military body armor (continuation of program initiated in FY 1995); Tested and reported results on DARPA body armor.
FY 1997	Establish working group within the NAAB to develop requirements for a quality assurance program, publish findings as an NIJ document.

2. Characterize oleoresin capsicum (OC) further in support of the less-than-lethal technologies program

FY 1988	Initiated three-year project to monitor the U.S. Army development effort to design and implement appropriate chemical delivery systems.
FY 1991	Began to identify the performance characteristics and requirements appropriate for inclusion in NIJ standards for less-than-lethal weapons to be established in FY 1992/93.
FY 1992	Initiated development of standard for less-than-lethal weapons delivery systems.
FY 1994	Initiated study to characterize oleoresin capsicum.
FY 1995	Published NIJ Report 100-95, Preliminary Investigation of Oleoresin Capsicum; Provided technical assistance and administrative support to program.
FY 1996	Analyzed the contents of several cans of oleoresin capsicum in connections with an incident involving the Baltimore County Police Department, where an

- individual exposed to the oleoresin capsicum spray exhibited no significant reaction; prepared official "report of analysis".
- FY 1997 Evaluate the contents of at least 100 canisters of OC spray used by the Los Angeles County Sheriff's Department in the course of duty to determine the possibility of any "trends"; Pending additional funding, identify, quantify, and further characterize the pungent constituents of commercial off-the-shelf oleoresin capsicum sprays.
3. Investigate DNA profiling technologies further and develop additional SRMs as applicable
- FY 1988 Developed preliminary standard for DNA reporting formats.
- FY 1989 Initiated two-year project to refine reporting standards, standard materials for molecular weight quality assurance, and even more sensitive detection and non-isotropic probes.
- FY 1991 Synthesized and characterized several potential standard reference materials; examined DNA coding systems and advanced and emerging DNA instrumental techniques; Completed the development of a standard reference material (SRM) for DNA genetic typing.
- FY 1992 Issued SRM 2390 for DNA quality assurance testing.
- FY 1993 Completed initial round robin tests of prototype SRMs for DNA profiling, employing the polymerase chain reaction (PCR) technique.
- FY 1994 Re-certified SRM 2390, the restriction fragment length polymorphism profiling standard; Validated the proposed components of SRM 2391; Developed new electrophoretic methods for STRs.
- FY 1995 Issued SRM 2391, the PCR profiling standard; Investigated method for typing mitochondrial DNA; First phase of a mitochondrial interlaboratory study was completed; Developed new approach to PCR amplification (i.e., "Long PCR"); Implemented laser-induced fluorescence detection for rapid detection of electrophoretically separated PCR products.
- FY 1996 Implemented Long PCR technology to aid in the rapid determination of human identity; Conducted several interlaboratory studies; Revalidated SRM 2390 and 2391.
- FY 1997 Finalize the production and certification of a set of well-defined DNA standards for mitochondrial and general DNA sequencing; Pursue the formation of a consortium of DNA chip manufacturers to address the needs of the forensic and paternity testing communities for a "human identity chip".
4. Prepare Digital Intercept Standard for digital telephone systems
- FY 1992 Initiated a project to assist the FBI in the development of a digital intercept system for integrated services digital network (ISDN).
- FY 1995 Prepared ten of the final sixteen parts of the draft standard; Continued to provide programmatic and technical support to the FBI; Witnessed first article testing and critically reviewed test data; Reviewed and commented in 14 other program documents.
- FY 1996 Prepared final six parts of the requirements documentation and began to develop test methods document.
- FY 1997 Provide all sixteen requirements documents to reviewers for comment; Edit accordingly, submit to WERB for review, and provide camera-ready copy to NIJ for publication; Complete draft of test methods.

5. Review and revision of standards

FY 1982	Three communication standards were revised to improve test methods and to change the classification system to achieve common transmission band identification; Revised metallic handcuff standard.
FY 1983	Additional two communication standards revised as above; Revised body armor standard.
FY 1984	Revised crash helmets standard.
FY 1985	Revised standards for riot helmets and face shields, body armor and personal FM transceiver standards.
FY 1987	Revised fixed and base station FM transmitters and mobile digital equipment standards.
FY 1988	Revised fixed and base station receivers standard.
FY 1989	Revised 9mm/45 caliber autoloading pistols and mobile antennas standards.
FY 1990	Revised body-worn FM transmitters standard.
FY 1996	Initiated collaboration with Canadian General Standards Board, CEN and ISO on soft body armor; Established contract with ITS for review of two NIJ communication standards and a FIPS on land mobile radio.
FY 1997	Prepare draft of body armor standard (0101.03) and ballistic resistant protective materials (0108.01); Publish revisions of communication standards (0204.01 and 0205.01); Prepare statements of work and funding proposals for metallic handcuffs (0307.01), emergency vehicle sirens (0501.00), walk-through and hand-held metal detectors (0601.00 and 0602.00), x-ray systems for bomb disarmament (0603.00), and kits for preliminary identification of drugs of abuse (0604.00 and 0605.00); continue support of land mobile radio effort.

6. Furnish technical support and assistance in key areas

FY 1990	Published report on lithium batteries, hands-free communication systems, and technical assessment of portable explosives vapor detection devices.
FY 1991	Prepared reports on handgun accuracy, trunked radio systems, body armor test fixtures, field strength measurements of high power transceivers, performance of dialed number recorders, and a standard for rechargeable transceiver batteries; Developed procedure for the analysis of residues of explosives and gunshots; Developed a guide to video surveillance equipment; Developed a computer program supporting the economical disposal of police vehicles.
FY 1992	Drafted report on instrumentation to measure forces on a holster when gun is withdrawn; Issued AutoBid, a computer program used by police departments for automobile fleet management.
FY 1993	Drafted standard for flammability of mattresses for detention and corrections facilities; Updated AutoBid; Published reports on locks for corrections facilities, trunked radio systems, a test procedure of handgun accuracy, a guide to voice privacy for law enforcement radio communication systems, and a standard for dialed number recorders.
FY 1995	Updated AutoBid; Served as DOC representative for law enforcement to the Technology Reinvestment Program.
FY 1996	Updated AutoBid; Initiated protective glove project; Assisted in establishment of program to produce guidelines for forensic laboratory design; Authored interagency agreement with FBI to develop automobile paint database in conjunction with RCMP; Lend support to BFRL in conjunction with U.S. Fire Administration to re-evaluate traditional "arson indicators".

FY 1997 Update AutoBid as interactive web site; Prepare draft standard for protective gloves; Publish guidelines for forensic laboratory design; Continue support of paint database development project; Publish findings from test burns; Publish findings from 2 drugs-of-abuse studies; Continue support of concealed weapons detection project within EEEL; Support two programs within the Office of Applied Economics, i.e., minimizing costs of the Life Safety Code for Corrections Facilities and cost-effective decisions for police patrol vehicle disposal (auto rank).

7. Support the quality assurance program for police traffic radar/lidar

FY 1991 Completed revision of model minimum performance specifications for radar units; Assisted independent laboratory with tests to determine compliance with specifications.

FY 1992 Initiated project to develop standard for laser based units (lidar); Initiated project to develop standard for photoradar.

FY 1994 Revised the Model Minimum Performance Specifications for Police Traffic Radar Devices; Supported the test program; completed preliminary laboratory and field tests of photoradar systems.

FY 1995 Supported the quality assurance testing program of the International Association of Chiefs of Police; Draft standard for laser speed-measuring devices completed and submitted to NHTSA; Model specifications published by NHTSA; Participated in reference speed comparison study with the Transportation Research Center, East Liberty, OH; Selected and equipped UC/Davis as IACP lidar test site; Prepared draft standard and submitted it to outside reviewers.

FY 1996 Presented and obtained approval for proposed revisions to conventional radar performance specifications; Published lidar standard.

FY 1997 Support conventional radar and lidar test programs; Assist in establishing a second lidar test site; Submit draft of photoradar standard to NHTSA for promulgation; Revise radar performance specifications to include approved changes.

8. Development of Interoperability Standards for Ballistic Imaging Systems

FY 1996 Published NISTIR 5855, "Specification for Interoperability Between Ballistic Imaging Systems; Part 1 - Cartridge Cases".

FY 1997 Publish Part 2, image acquisition in connection with bullets; Conduct laboratory and field evaluations of parts 1 and 2 of the standard; Continue effort to address networking capabilities in order to begin preparation of part 3.